

GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF AUGUST 21, 1993

1. Central United States:

MORE WET WEATHER.

Up to 90 mm of rain drenched North Dakota while as much as 125 mm fell on already-saturated Iowa during the past week. Other areas, however, received less than 40 mm. In the past six weeks, almost five times the normal rainfall was measured in parts of North Dakota. Although river levels are below the peak crests reached a few weeks ago, most of the upper and middle Mississippi and the middle and lower Missouri Valleys remain prone to additional flooding [27 weeks].

2. Southern and Southeastern United States and Northeastern Mexico:

STILL VERY DRY.

Less than 20 mm of rain fell on the region as abnormally dry conditions expanded into northeastern Mexico; however, parts of Florida received up to 40 mm. Six-week moisture deficits reached 140 mm in Texas and 200 mm in Florida [8 weeks].

3. Northeastern Argentina:

ABNORMAL DRYNESS CONTINUES.

Little precipitation (up to 20 mm) was reported across the region. Nine-week soil moisture deficits ranged from 35 to 110 mm while amounts for the period were generally less than 30% of normal (see page 2) [8 weeks].

4. Southern Argentina:

UNUSUALLY WARM WEATHER DEVELOPS.

Abnormally warm conditions, with temperatures averaging 2°C to 4°C above normal, spread through the region [3 weeks].

5. Southern Europe:

VERY WARM AND DRY CONDITIONS REPORTED.

Temperatures averaging up to 6°C above normal aggravated unusually dry conditions across much of the region [WARM - 3 weeks]. Less than 20 mm of rain fell on most locations last week, but isolated areas received up to 50 mm [DRY - 4 weeks].

6. Northwestern India:

MONSOON RAINS ABATE.

Although isolated locations measured as much as 70 mm of rain, most areas received little or no precipitation. During the past four weeks, moisture deficits have been slowly growing through the formerly wet region [Ended at 10 weeks].

7. Southern China and Northern Philippines:

TYPHOON TASHA DELIVERS MORE HEAVY RAIN.

The system that became Typhoon Tasha lashed the northern Philippines with heavy rains and high winds, causing severe flooding and mudslides, according to press reports. The storm then moved westward into the South China Sea and strengthened as it approached southeastern China. Press reports indicate that communications and transportation were knocked out and numerous homes were destroyed. As much as 290 mm of rain drenched southern China, allowing six-week moisture surpluses to reach 180 mm at some locations (see front cover) [18 weeks].

8. Eastern Mongolia and Northeastern China:

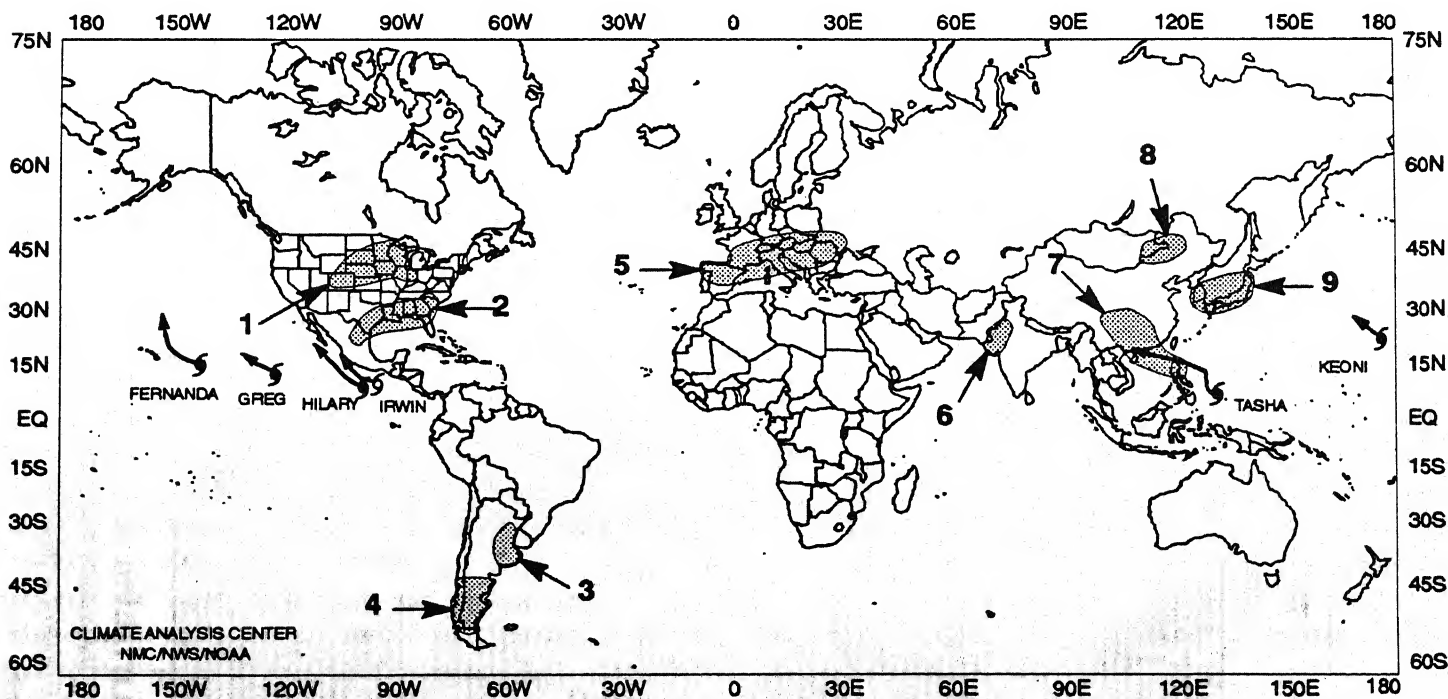
WET WEATHER EASES.

Only 10 to 40 mm of rain fell on the region this past week; however, some locations in northeastern China were drenched by over four times the normal rainfall during the past six weeks, with surpluses of up to 300 mm since the beginning of July [18 weeks].

9. Japan and South Korea:

COOL AND WET CONDITIONS PERSIST.

Temperatures averaged as much as 5°C below normal as heavy rains continued to lash the country [COOL - 3 weeks]. As much as 500 mm of rain drenched northern Kyushu and the Tsu Islands last week. Farther west, Korea was soaked by up to 300 mm of rain. Since the beginning of July, moisture surpluses reached 900 mm in parts of Kyushu, which is approximately four times the normal for the period [10 weeks].



EXPLANATION

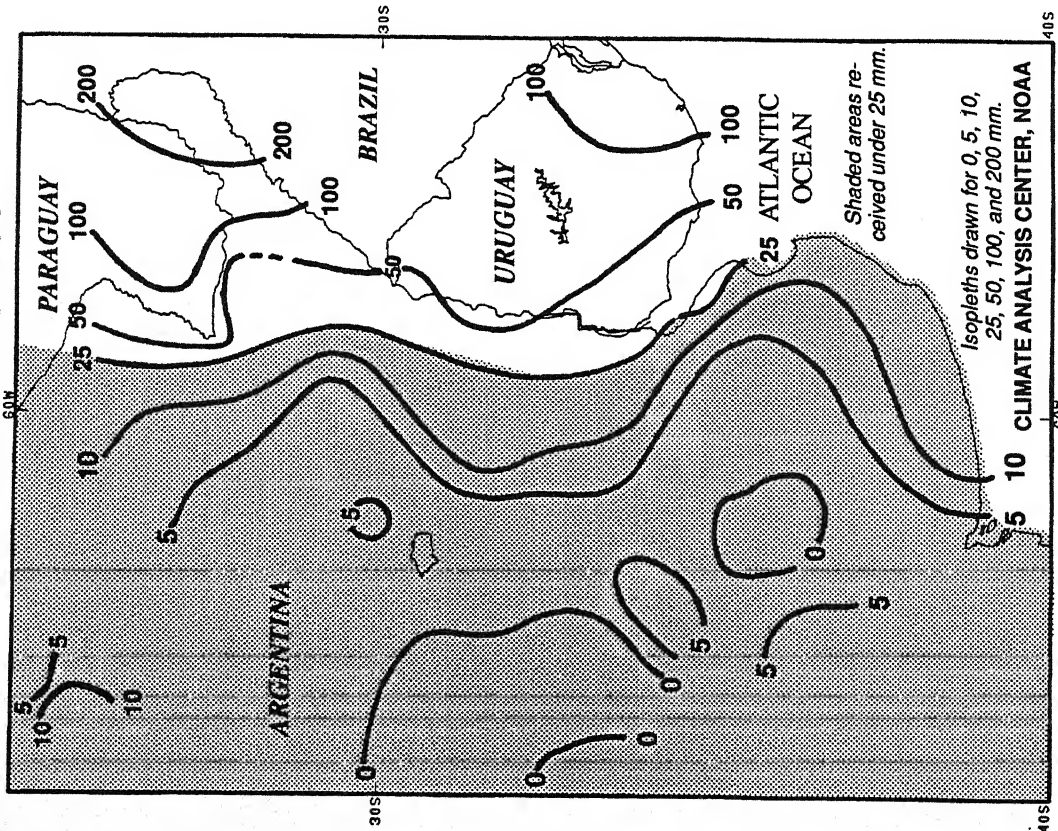
TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.

MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long-term anomalies, and other details.

GLOBAL CLIMATE HIGHLIGHTS FEATURE

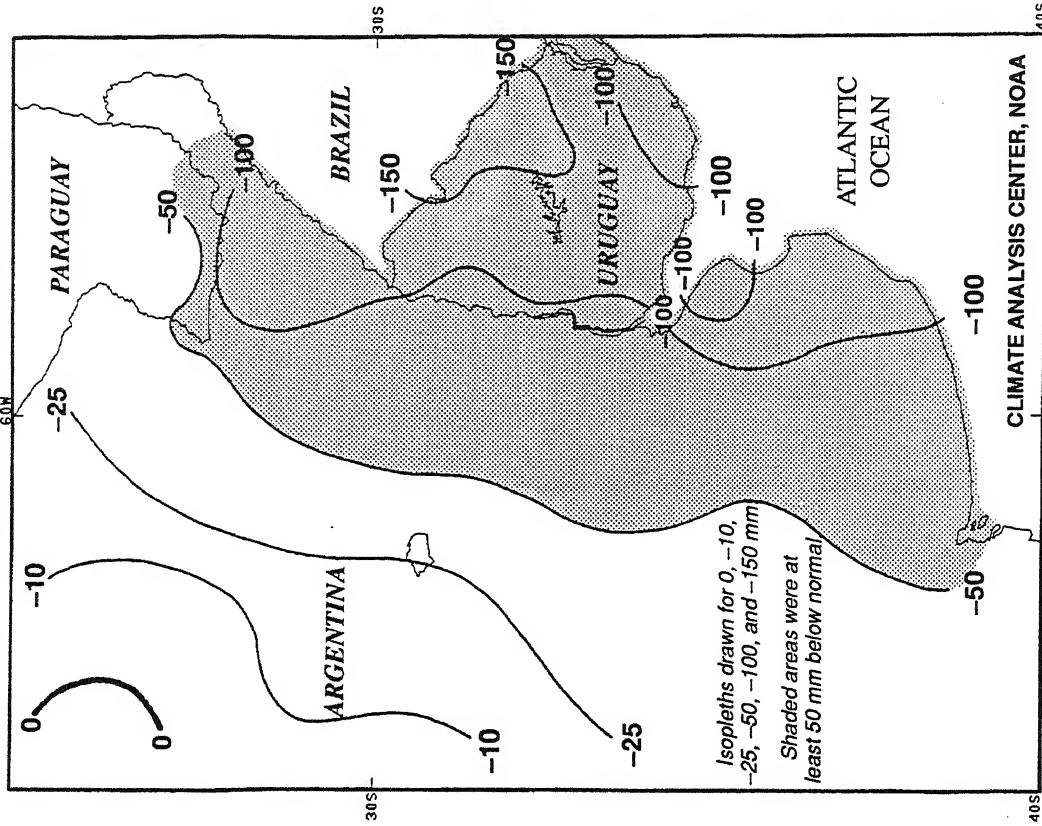
TOTAL PRECIPITATION (mm)

June 20 – August 21, 1993 [63 days]



DEPARTURE FROM NORMAL PRECIPITATION (mm)

June 20 – August 21, 1993 [63 days]



VERY LITTLE PRECIPITATION OBSERVED ACROSS NORTHEASTERN ARGENTINA AND URUGUAY. Under 25 mm fell on most of northeastern Argentina during the last nine weeks, with some locations reporting no measurable rainfall since June 20 (which is 6 to 40 mm below normal). Across extreme northeastern Argentina and Uruguay, significant rainfall (50–200 mm) was observed, but the region's higher normals allowed moisture deficits of 100–165 mm to accumulate through most of the area.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF AUGUST 15-21, 1993

Powerful thunderstorms swept across parts of the middle Missouri Valley, much of the western and central Corn Belt, and northern portions of the mid-Atlantic, accompanied by high wind, hail, and torrential downpours. Heavy rain (unofficial reports of up to ten inches) across southern Minnesota and northern Iowa on Sunday sent the Cedar River out of its banks, forcing more than 1,500 people in the Austin, MN and Charles City, IA areas to evacuate. Severe thunderstorms also pummelled northern Illinois on Sunday, with lightning killing one person and injuring five others in Chicago, according to press reports. The storms knocked out electrical power to about 50,000 people throughout the metropolitan area. Heavy rain in eastern Iowa on Monday covered U.S. 61 under one and a half feet of water, and flooded streets in Davenport and other nearby towns. On Tuesday, nearly a foot of rain caused widespread flooding and numerous road closures across western and central Indiana as well as eastern Pennsylvania. Near Cloverdale, IN, rising floodwaters pushed homes off their foundations, overturned mobile homes, and closed Interstate 70. The Philadelphia area was hit by some of the worst flooding in ten years, forcing at least 130 people from their homes in the northern suburbs. Intense thunderstorms continued to develop across the central Plains and Midwest during the latter part of the week. On Thursday, thunderstorms dumped heavy rain on already-saturated southern Iowa, flooding portions of Highways 65 and 34 near Lucas. On Friday, four inches of rain brought Prairie Dog Creek out of its banks, causing lowland flooding near Rexford, KS, while more than two inches of rain in about 30 minutes caused flash floods in Anselmo, NE, late Saturday night. Elsewhere, hot and dry weather continued to grip the southern Plains as temperatures again soared into the hundreds. Austin, in central Texas, has been without rain for a record 56 days, breaking the old record of 54 days set in 1962.

At the start of the week, severe thunderstorms extended from the middle Missouri Valley to the southern portions of the Great Lakes ahead of a slow eastward-moving frontal system. Farther west, a second system brought severe weather and heavy rain to the northern Rockies and northern High Plains while thunderstorms were scattered in the hot, humid air across the central Gulf Coast and the Florida peninsula. Locally heavy rain also produced flooding in northeastern Oregon and southeastern Washington. By Tuesday, the storm system in the central States spread severe weather and heavy rain across the Midwest and into the mid-Atlantic and Northeast. Farther west, the second system moved eastward into the northern and central High Plains, with thunderstorms continuing to develop in the hot, muggy air ahead of the storm. Hot conditions persisted across the South, where several daily record highs were established along the Gulf coast.

At mid-week, the eastern frontal system moved into the Atlantic while the second system crossed the middle Missouri and

upper Mississippi Valleys. Showers and severe some with torrential downpours, again soaked much of the Plains and upper and middle Mississippi Valley. Rain was widely scattered across the South and along the Atlantic coast. During the latter part of the week, the northern storm system moved quickly eastward into the Atlantic, spreading more rain over the Midwest, mid-Atlantic, and Northeast. The southern portion of the system became more active, reaching from the Carolina coast to the central Gulf Coast. Showers and thunderstorms scattered in the hot, humid air ahead of the front. Elsewhere, showers were scattered over the Northwest while high winds and torrential rains caused flooding around Seward, on the south-central coast. By the week's end, a third storm system brought more severe weather with locally heavy rain to the northern and central Rockies and northern and central Plains. Meanwhile, high pressure moved in, bringing fair weather to the upper Mississippi and Ohio Valleys, mid-Atlantic, and Northeast.

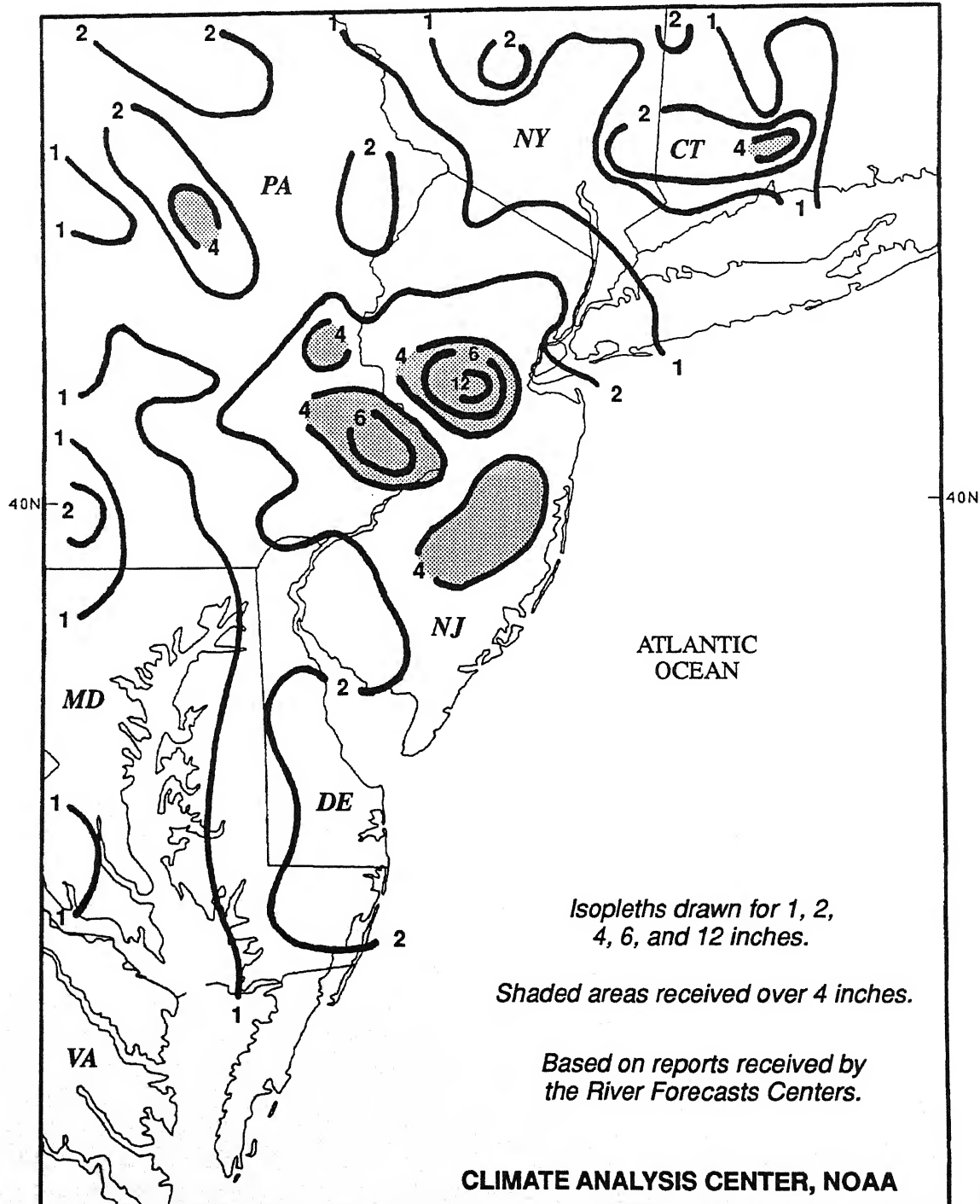
According to the River Forecast Center, weekly precipitation totals (between two and twelve inches) were scattered from southeastern Minnesota and Iowa southeastward to Indiana, from southwestern New York to New Jersey, Delaware, and across portions of the central Plains, Kentucky, England, and the central Gulf Coast. Amounts of one to three inches were also scattered across the Southeast, the central Plains, the northern Plains, the Rockies, the Northwest, the south-central and southeastern Alaska, and the remainder of the Mississippi and Ohio Valleys and the Northeast. Light precipitation was observed in Hawaii, northern California, and the remainders of the Northwest, the Rockies, Alaska, and the western half of the nation. Little or no precipitation was reported in the Great Basin, central and southern California, and the southern Plains.

In the contiguous United States, temperatures were above normal across most of the eastern two-thirds of the United States and along the immediate Pacific Coast. Departures from normal were prevalent over eastern Kansas, eastern Oklahoma, Missouri, Arkansas, and the southern Appalachians. Above normal temperatures were limited to the panhandle and northwestern portions of the state, reaching +3°F at Barrow. Temperatures averaged 5°F above normal across Hawaii.

Abnormally cool weather prevailed over the western half of the United States, with weekly departures below normal in eastern California, Nevada, interior Oregon, and Idaho. Below normal temperatures also covered the remainder of Alaska, with temperatures averaging 5°F below normal.

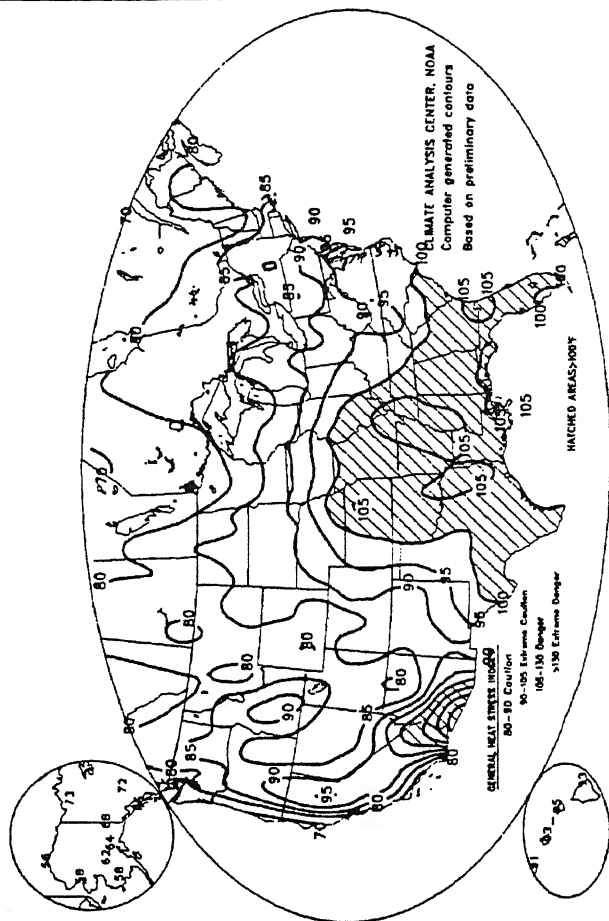
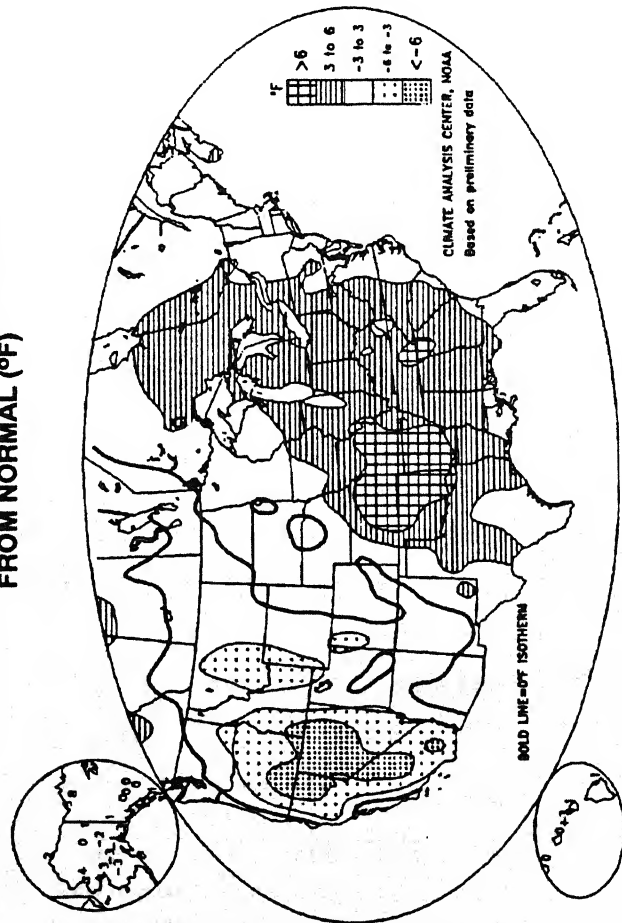
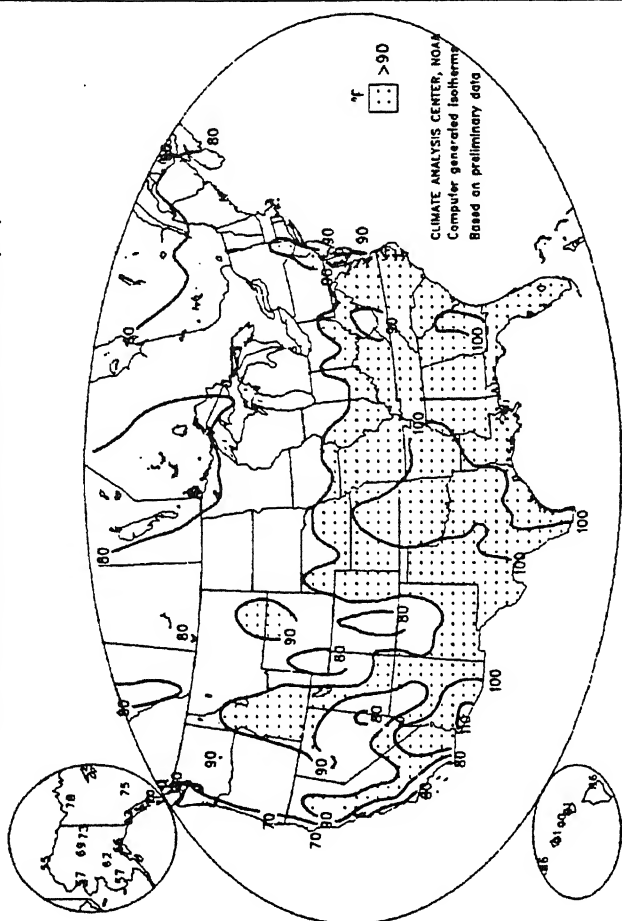
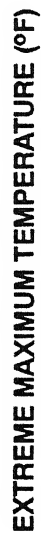
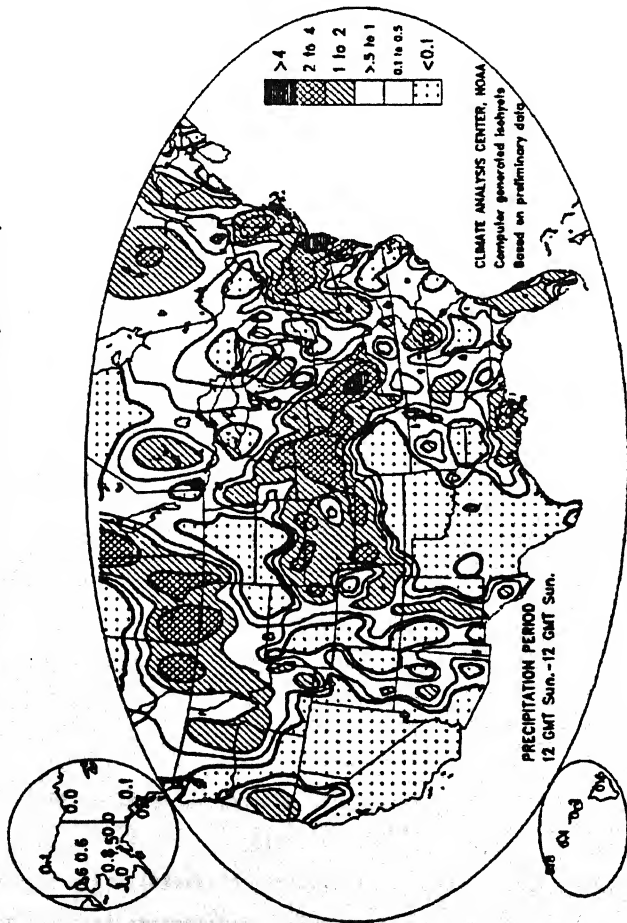
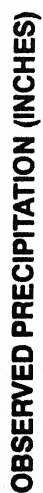
UNITED STATES HIGHLIGHTS FEATURE

TOTAL PRECIPITATION (in) August 8-15, 1993



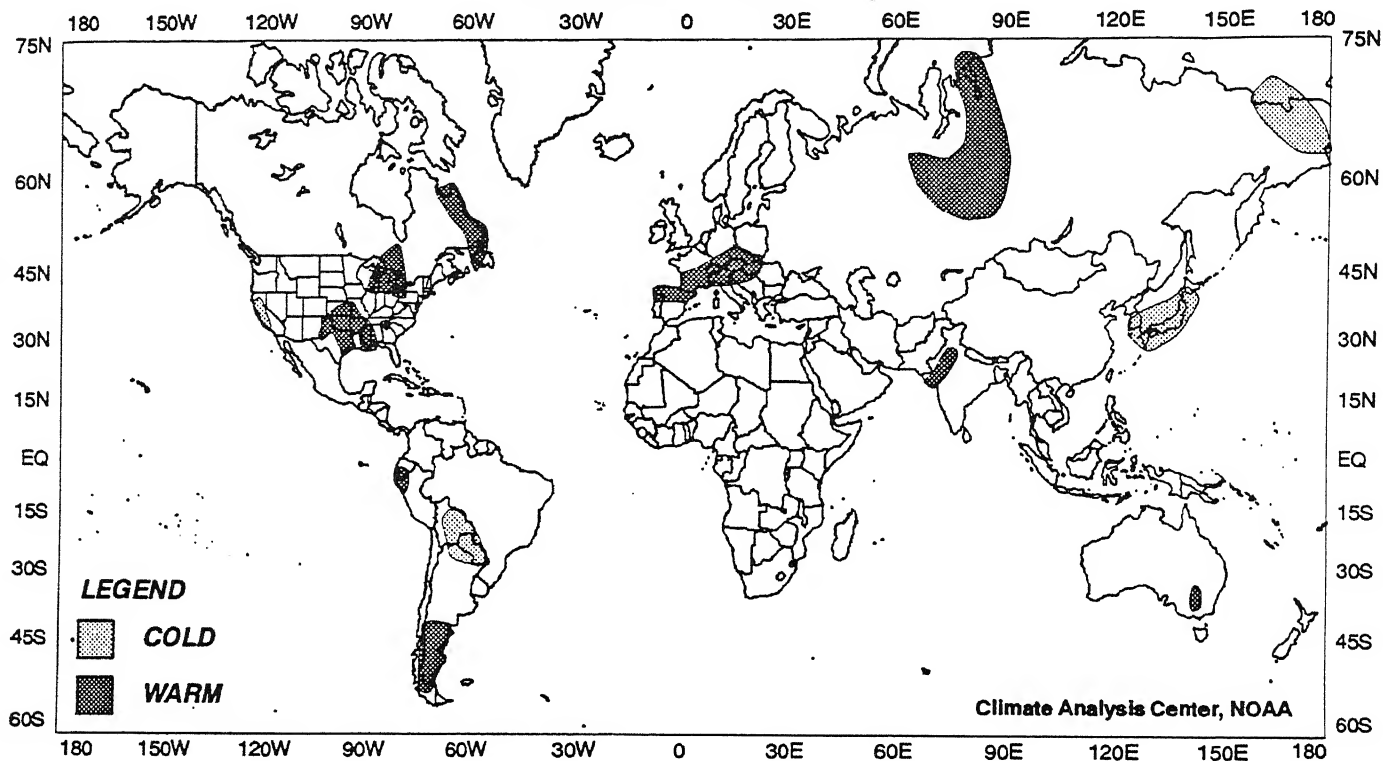
LOCALLY EXCESSIVE RAINFALL GENERATES SEVERE FLOODING IN PARTS OF SOUTHEASTERN PENNSYLVANIA AND CENTRAL NEW JERSEY. According to press reports, the Philadelphia area experienced some of the worst flooding in ten years as heavy thunderstorms dropped 6 – 12 inches of rain on some areas, much of which fell within a day, in the midst of what has been an unusually dry summer at most locations. At least 130 individuals were forced from their homes in Philadelphia's northern suburbs, particularly in Bucks County, where one creek rapidly rose to four feet above flood stage Tuesday morning.

UNITED STATES WEEKLY CLIMATE CONDITIONS (August 15 – 21, 1993)



TWO-WEEK GLOBAL TEMPERATURE ANOMALIES

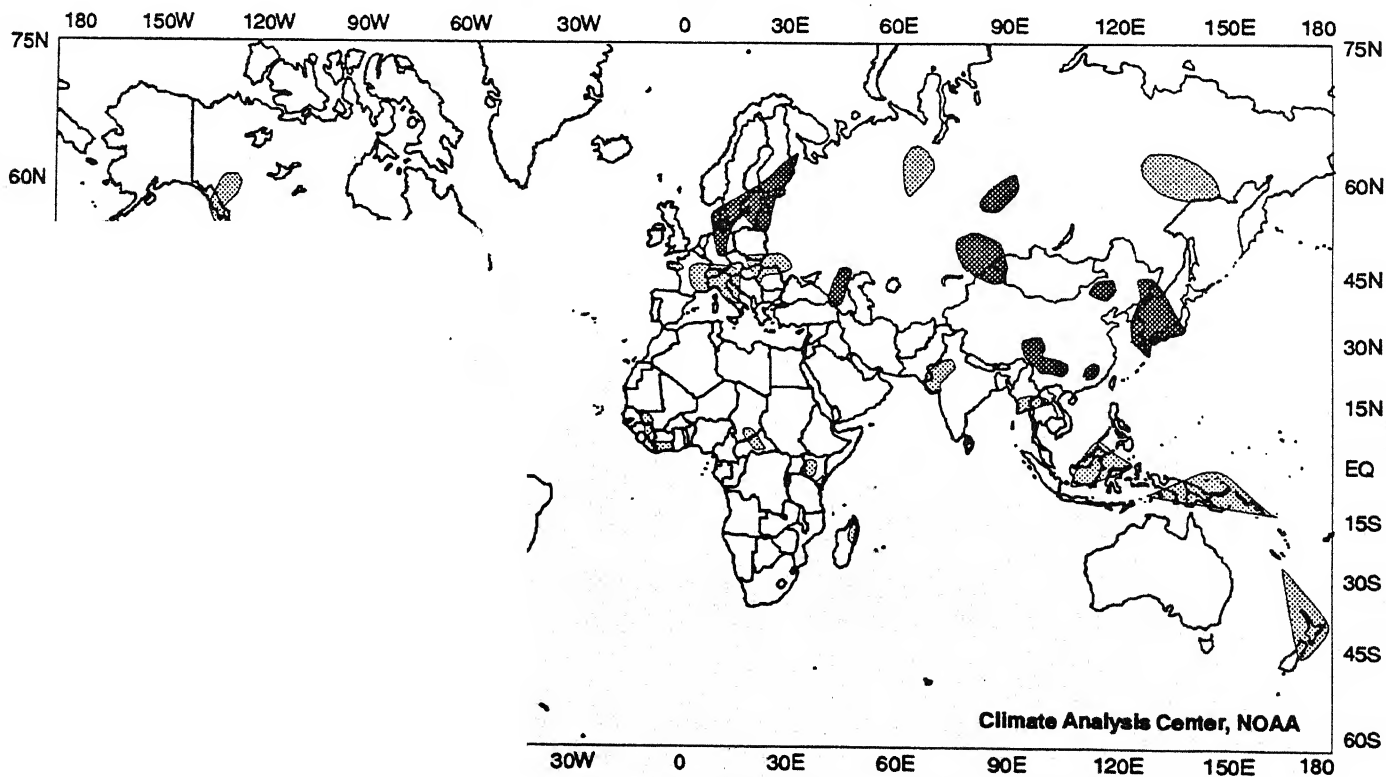
AUGUST 8 – 21, 1993



Shading depicts regions where temperature anomalies were estimated to be within the warmest 10% or coldest 10% of climatological occurrences.

FOUR-WEEK GLOBAL PRECIPITATION ANOMALIES

JULY 25 – AUGUST 21, 1993



were estimated to be within the wettest 10% or driest 10% of climatological occurrences.

EL NIÑO / SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC ADVISORY 93/05

**ISSUED BY
DIAGNOSTICS BRANCH
CLIMATE ANALYSIS CENTER, NMC
August 10, 1993**

Warm episode conditions weakened during July, as sea surface temperature (SST) anomalies decreased and equatorial easterlies increased in many sections of the tropical Pacific. Near-normal equatorial easterlies were observed throughout the Pacific during July, following eight consecutive months of weaker than normal easterlies. SST anomalies continued to decrease markedly in the Niño 3 region (Fig. 1) as the climatological cold tongue became well-established. However, significant positive SST anomalies (near 2°C) remained in the Niño 4 region (from the date line eastward to 160°W), and along the west coast of South America (Fig. 2). Enhanced convection continued along the equator throughout the date line, consistent with the anomalously warm conditions in that region. The remainder of the tropics showed near-normal convective activity during July.

In spite of the return to near normal equatorial easterlies, the overall pattern of sea level pressure (SLP) anomalies remained similar to that observed during the last several months. Negative SLP anomalies continued in the eastern tropical Pacific, while positive SLP anomalies were observed throughout Indonesia (Fig. 3). Consistent with this, the Southern Oscillation Index (SOI) was again negative (-1.1).

The present warm episode, which developed during

mid-1991, reached the mature phase during late 1991. Mature-phase conditions continued until mid-1992, when the equatorial Pacific became negative, similar to the evolution presently being observed. The redevelopment of mature-phase warm episode conditions in late 1992 was not expected. Given the similarity between the evolution of atmospheric and oceanic conditions during mid-1992 and that being observed this year, one should consider the possibility of the redevelopment of mature-phase warm episode conditions during late 1993.

That possibility is supported by the latest canonical correlation analysis (CCA) forecast, which indicates positive SST anomalies continuing into early 1994. The CCA is based on the existing patterns of anomalous sea level pressure and sea surface temperature which indicate ongoing low-SOI or warm episode conditions. Numerical model forecasts (NMC coupled model and Cane-Zebiak model), on the other hand, indicate either near-normal or cooler than normal sea surface temperatures through early 1994.

Since atmospheric and oceanic conditions indicate that the effects of the 1991-1993 warm episode have greatly diminished, this will be the last in this series of advisories. Additional advisories will be issued only if there is a significant redevelopment of warm episode conditions.

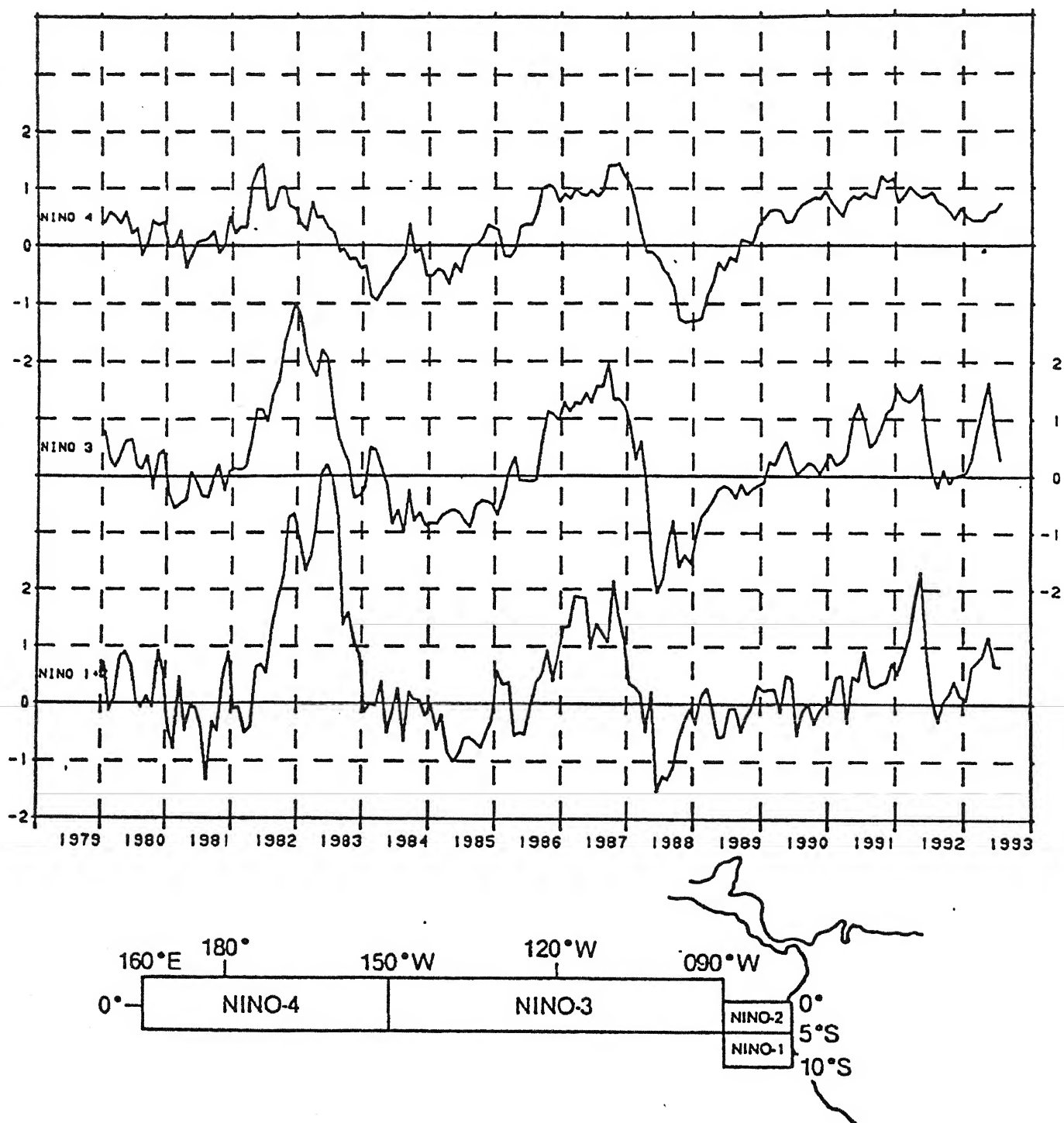


FIGURE 1. Equatorial Pacific sea surface temperature anomaly indices ($^{\circ}\text{C}$) for the areas indicated in the figure. Niño 1+2 is the average over the Niño 1 and Niño 2 areas. Anomalies are computed with respect to the COADS/ICE climatology (Reynolds 1988, *J. Climate*, 1, 75–86).

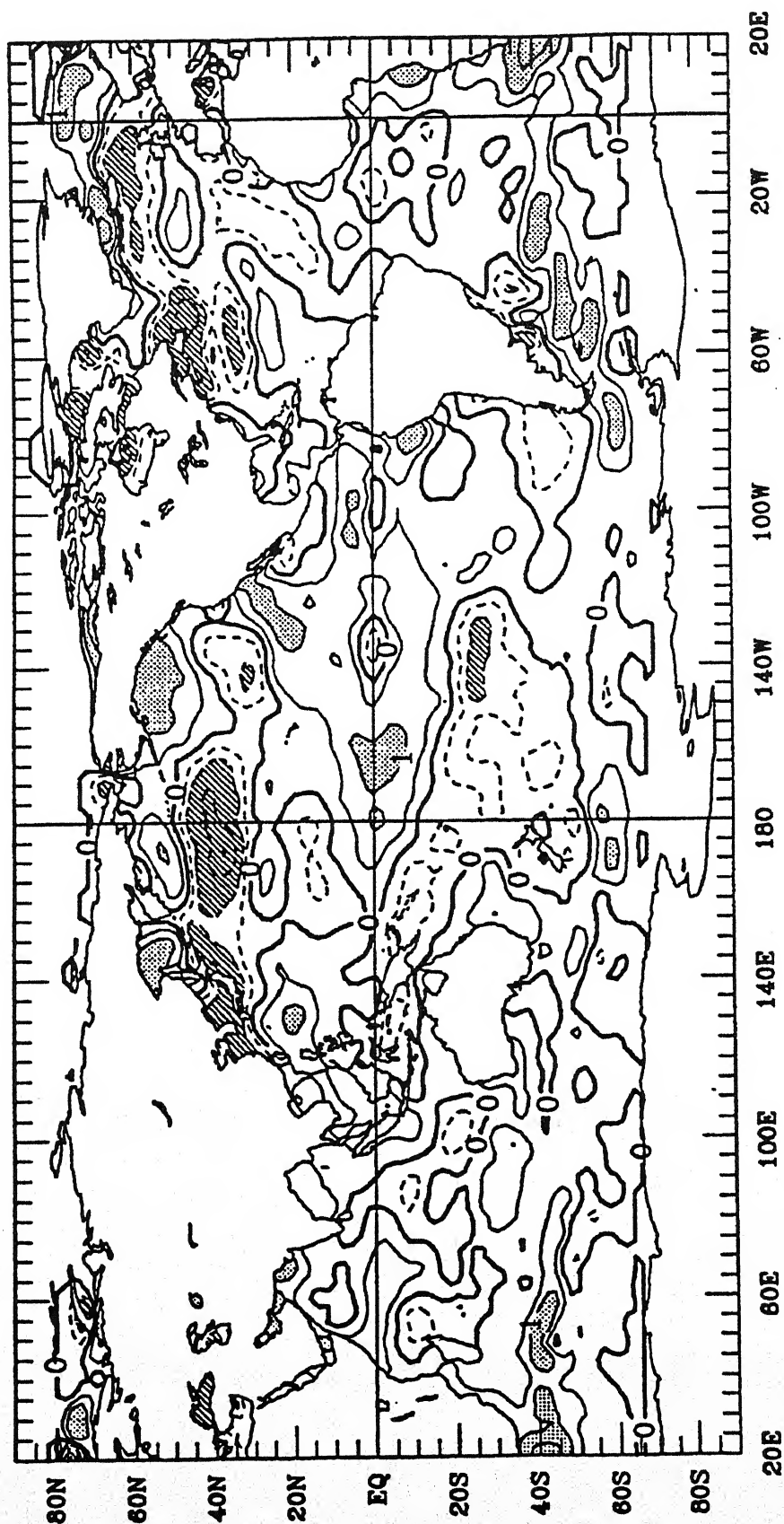


FIGURE 2. Blended sea surface temperature anomaly pattern for June 1993. The contour interval is 1°C and negative contours are dashed. Additional contours of $\pm 0.5^\circ\text{C}$ are shown. Heavy contours are at 0°C . Light (dark) shading indicates anomalies greater (less) than 1°C (-1°C). Anomalies are computed as departures from the COADS/ICE climatology (Reynolds 1988, *J. Climate*, **1**, 75–86).

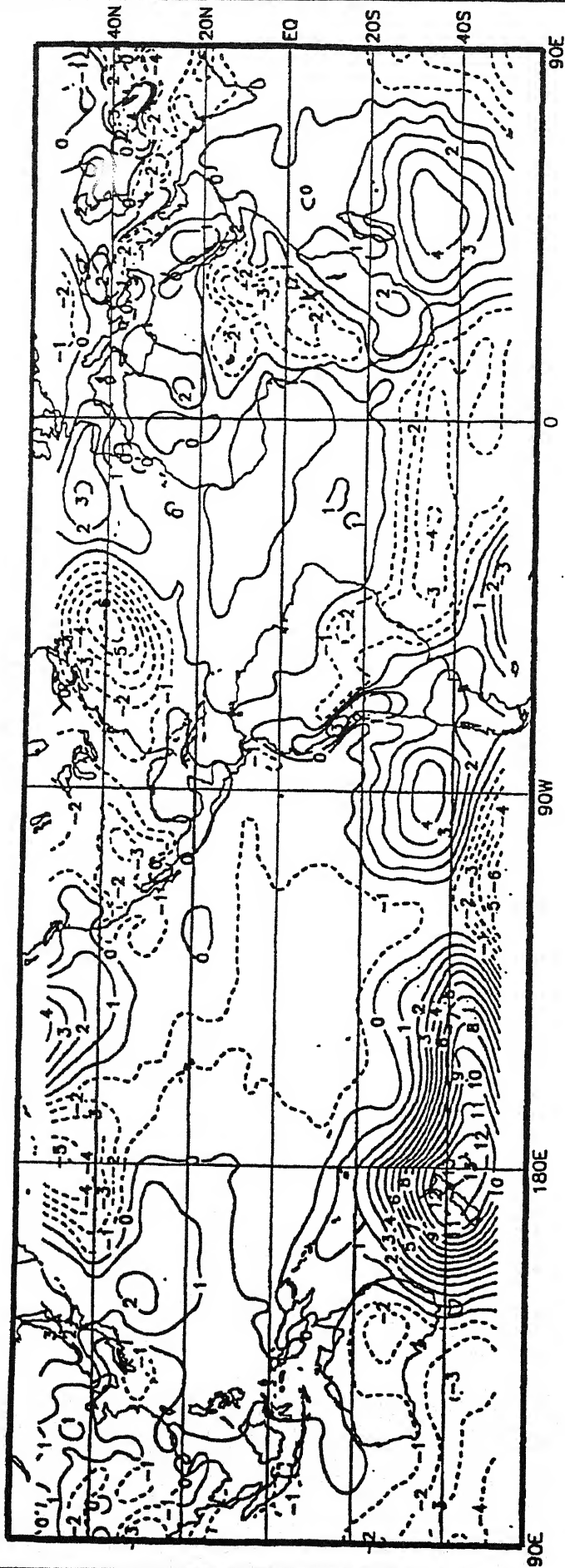


FIGURE 3. Sea level pressure anomalies for July 1993. Anomalies are computed as departures from the 1979–1988 base period monthly means. The contour interval is 1 mb and negative anomalies are indicated by dashed contours. The analysis should be treated with caution in the regions of elevated terrain.